Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L5	523	438/308,378,795.ccls. and @ad<"20000317"	US-PGPUB; USPAT	OR	ON	2005/08/16 15:33
L6	544	219/443,450,409,411,413.ccls. and @ad<"20000317"	US-PGPUB; USPAT	OR	ON	2005/08/16 15:37
L7	536	6 not 5	US-PGPUB; USPAT	OR	ON	2005/08/16 15:33
L8	12	(temperature and (wafer or substate) and gas and control$4 and selectively and directly).clm.	US-PGPUB; USPAT	OR	ON	2005/08/16 15:37
L9	54	(temperature and (wafer or substate) and gas and control$4 and selectively and direct$3).clm.	US-PGPUB; USPAT	OR	ON	2005/08/16 15:42
L10	42	9 not 8	US-PGPUB; USPAT	OR	ON	2005/08/16 15:37
L11	21	10 and @ad<"20000317"	US-PGPUB; USPAT	OR	ON	2005/08/16 15:43
L12	8	(temperature and (wafer or substate) and gas and control$4 and selective and direct$3).clm.	US-PGPUB; USPAT	OR	ON	2005/08/16 15:42
L13	4	12 and @ad<"20000317"	US-PGPUB; USPAT	OR	ON	2005/08/16 15:43

US-PAT-NO: 5654904

DOCUMENT-IDENTIFIER: US 5654904 A

TITLE: Control and 3-dimensional simulation model of temperature variations in a rapid thermal processing machine

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Claims Text - CLTX (1):
  1. A rapid thermal process for presetting and **controlling** a heating system used to heat a semiconductor **wafer,** the process comprising:

Claims Text - CLTX (2):
  a) initializing input data to a computer main program, the input data including indicia relating to the heating system and properties of the semiconductor **wafer;**

Claims Text - CLTX (3):
  b) calculating an expected **temperature** for a plurality of three-dimensional **wafer** volume elements versus time, responsive to the input data indicia;

Claims Text - CLTX (4):
  c) individually **controlling** a power level to multiple heating elements within the heating system, the power level being **controlled, directly** or indirectly, by the computer main program responsive to the expected **temperature** calculated for the volume elements to provide a predetermined **temperature** ramp rate and steady state level for minimal **wafer temperature** nonuniformity;

Claims Text - CLTX (5):
  d) monitoring the **wafer temperature** with at least one **temperature** sensor; and,

Claims Text - CLTX (6):
  e) providing a **temperature** feedback from the **temperature** sensor to, **selectively,** a heat **controller** or the computer main program, thereby providing for quick and accurate **controlling of the wafer temperature.**

Claims Text - CLTX (7):

2. The process as recited in claim 1 wherein the semiconductor **wafer** has a diameter of between about 6 inches to about 12 inches.

Claims Text - CLTX (8):
3. The process as recited in claim 1 wherein the semiconductor **wafer** has a pattern which is irregular.

Claims Text - CLTX (10):
a) initializing secondary input data to the computer main program, the secondary input data including indicia relating to the heating system and properties of at least a second semiconductor **wafer**;

Claims Text - CLTX (11):
b) monitoring the at least second **wafer temperature** of the at least second **wafer** with at least one **temperature** sensor; and,

Claims Text - CLTX (12):
c) providing a **temperature** feedback from the **temperature** sensor to, **selectively,** the heat **controller** or the computer main program, thereby providing for quick and accurate **controlling** of the at least second **wafer temperature**.

Claims Text - CLTX (14):
6. The process as recited in claim 1 wherein the computer main program includes, **selectively,** fuzzy logic, a neural network, or a combination of fuzzy logic and a neural network.

Claims Text - CLTX (15):
7. The process as recited in claim 1 further including providing a **gas** around the semiconductor **wafer** while heating the semiconductor **wafer**.

Claims Text - CLTX (16):
8. The process as recited in claim 7 further including **controlling a gas** pressure while heating the semiconductor **wafer**.

Claims Text - CLTX (17):
9. A computer **control** system for presetting and **controlling** a heating system to heat a semiconductor **wafer,** the system comprising:

Claims Text - CLTX (18):
a) a main computer and computer program having input data, the input data including indicia relating to the heating system and properties of the

semiconductor **wafer**;

Claims Text - CLTX (19):
   b) means for calculating an expected **temperature** for a plurality of
three-dimensional **wafer** volume elements versus time, responsive to the input
data indicia;

Claims Text - CLTX (20):
   c) a heat **controller** having an input signal from, **selectively, a temperature**
indicator or the main computer;

Claims Text - CLTX (21):
   d) the heating system having a power input from the heat **controller**;

Claims Text - CLTX (22):
   e) at least one **temperature** sensor; and,

Claims Text - CLTX (23):
   f) a **temperature** feedback means for feeding back **temperature** data from the
at least one **temperature** sensor to, **selectively,** the heat **controller** or main
computer, wherein the main computer outputs time, **temperature, wafer** X and Y
coordinates for the volume elements, and heat intensity to preset and **control**
the heating system power input.

Claims Text - CLTX (24):
   10. The system as recited in claim 9 wherein the semiconductor **wafer** has a
diameter of between about 6 inches to about 12 inches.

Claims Text - CLTX (25):
   11. The system as recited in claim 9 wherein the semiconductor **wafer** has a
pattern which is irregular.

Claims Text - CLTX (26):
   12. The system as recited in claim 9 further including the main computer
and computer program having secondary input data, the secondary input data
including indicia relating to the heating system and properties of at least a
second semiconductor **wafer**.

Claims Text - CLTX (28):
   14. The system as recited in claim 9 wherein the computer main program
comprises, **selectively,** fuzzy logic, a neural network, or a combination of
fuzzy logic and a neural network.

Claims Text - CLTX (29):

15. The system as recited in claim 9 further including means for providing a **gas** around the semiconductor **wafer** while heating the semiconductor **wafer**.

Claims Text - CLTX (30):

16. The system as recited in claim 15 further including means for **controlling a gas** pressure while heating the semiconductor **wafer**.